BRITISH MEDICAL JOURNAL

LONDON, SATURDAY 28 NOVEMBER 1987

Diagnosis of diabetes mellitus: pitfalls in the glucose tolerance test

The oral glucose tolerance test is still the definitive test for diagnosing diabetes mellitus, although the diagnosis can be made without the test when the patient has typical features of the disease and a raised plasma glucose concentration. Many glucose tolerance tests are carried out in hospitals, with the average hospital laboratory performing about five a week (with considerable variation between individual hospitals).[1] Nevertheless, despite recent attempts to try to standardise the procedure for both performing and interpreting the test,[2-5] a recent survey has shown that agreed protocols, such as that of the World Health Organisation expert committee,[3 5] are not always followed.

As an example, the World Health Organisation specifies a fasting period of 10 to 16 hours.[5] Most of the respondents to a questionnaire sent out by a working party of the Association of Clinical Biochemists said that they fasted patients for between nine and 14 hours, but a tenth simply asked patients to fast "overnight" and a few asked them to fast for as little as five hours. Previous carbohydrate intake may also influence the glycaemic response and an unrestricted diet containing at least 150 g of carbohydrate a day is advised for the three days before the test.[5] Nevertheless, most laboratories assumed that this was the case without actually specifying it. Over four fifths of hospitals were using the currently recommended 75 g load of glucose,[5] but the remainder were using 50 g. Another difference in approach is the type of glucose used. The World Health Organisation recommends using 75 g of glucose but does not say whether this is anhydrous glucose or the monohydrate; hence some centres are using one form and some the other, with a resultant difference of about 10% in the actual load of glucose given. Though this discrepancy in a total dose of about 75 g may not evoke much difference in the blood sugar response, it is an undesirable and avoidable potential source of variation. As the monohydrate is the most readily available form, it would seem sensible to standardise on this. Again, about a fifth of laboratories used proprietary liquid preparations of partially hydrolysed starch (such as Lucozade), but sometimes the volume used differed from that recommended.

The World Health Organisation criteria for interpreting the results of the glucose tolerance test vary depending on the type of specimen used—for example venous whole blood, venous plasma, or capillary whole blood. The 1980 World Health Organisation report gave no figures for capillary plasma,[3] which was used by a tenth of the participants in the survey and will in some instances yield higher results than venous plasma. The 1985 World Health Organisation report does, however, include figures for capillary plasma,[5] but probably many laboratory staff and clinicians are still unaware of the more recent document.

Clearly when interpreting the results of a glucose tolerance test the doctor must know about such influencing factors and what protocol was used. Failure to pay attention to this type of detail might lead to a patient being incorrectly classified as a diabetic, with lifelong consequences—medical, social, legal, and financial. A degree of glucose tolerance intermediate between normality and diabetes, termed "impaired glucose tolerance," does not necessarily foreshadow diabetes, and indeed may revert to normal; hence it should not be regarded in the same way as a diagnosis of definite diabetes.

The results of glucose tolerance tests are often reported without any comment to clinicians. Even if they are familiar with the World Health Organisation criteria for classification, they may not know the details of their own laboratory's procedure and hence may misinterpret the results using the wrong set of figures. Such a pitfall may be avoided by closer cooperation between the laboratory and the clinician. The laboratory should be able to offer an interpretation or at least to advise on the best criteria to use; if this information is not volunteered the clinician should ask for it.

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